

Aerogel Insulation to Support Cryogenic Technologies, Phase II

Completed Technology Project (2006 - 2008)



Project Introduction

NASA is seeking a high performance thermal insulation material for cryogenic applications in space launch development. Many of the components in cryogenic distribution systems at the launch site can be complex and require an insulation that can be formed to irregular shapes to minimize heat leak. Aerogel beads are configurable to virtually any shape and offer a lightweight insulation solution with substantial improvements over conventional insulations. Success in the commercialization of high performance insulating aerogel beads has relied on the effectiveness of converting loose beads into functional insulation components. This type of insulation component requires reasonable mechanical strength and should be able to withstand a certain degree of compression, tensile, and flexural loads. Aspen Aerogels' solution entails the use of mechanically resistant aerogel beads and a binder that does not penetrate the surface of the beads. Preliminary investigation into composite development in the Phase I effort has resulted in a net shape insulation component having excellent thermal and mechanical properties. This type of insulation component is able to fill areas that are currently inaccessible with existing insulation products. A high-performance thermal insulation composite, such as that described in this proposal, will have a significant impact in insulation technology advancement.

Anticipated Benefits

Potential NASA Commercial Applications: Applications for Aspen Aerogels' bead composites are not restricted to NASA's field of interest. Important industry applications include transfer and storage of liquefied natural gas or for transferring crude oil beneath the ocean. The novel insulation produced could also be used for high temperature superconducting (HTS) power transmission lines that require cooling with liquid nitrogen. Aspen's hybrid aerogel beads can offer thermal management solutions for handling or transportation of various cryogenics (LOX, LH2, LN2, LHe, and LNG), supporting cryogenic equipment manufacturers and suppliers. Provided low enough costs, the aerogel beads could become a commodity used in refrigerators and household freezers.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

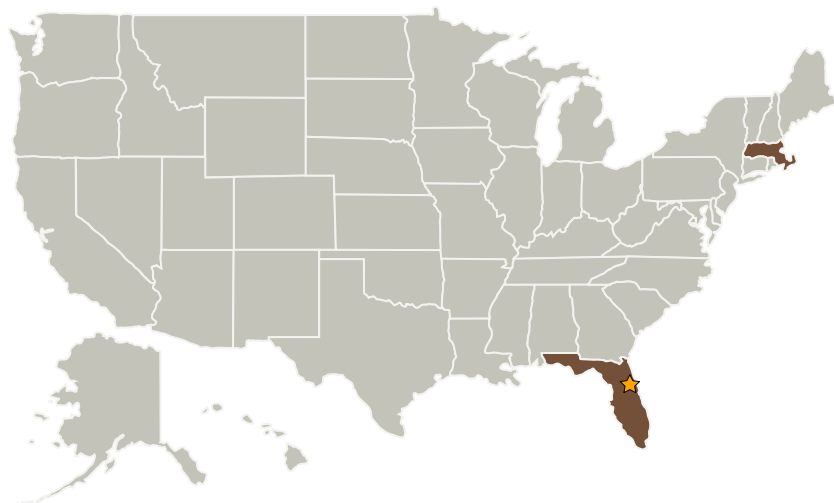
Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
Aspen Aerogels, Inc.	Supporting Organization	Industry	Northborough, Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Duan L Ou

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.2 Thermal Control Components and Systems
 - └ TX14.2.4 Insulation and Interfaces

Primary U.S. Work Locations

Florida	Massachusetts
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